Tactus Telemetry Solutions Ltd

MTC45 GSM GPRS Terminal
User Manual

TTS MTC45 GSM GPRS Terminal

1. INTRODUCTION

Tactus Telemetry Solutions Ltd (TTS) bring you the MTC45 GSM GPRS Terminal, which enables the Siemens MC45 or TC45 modules to be used conveniently and safely in many communications applications.

The MC45 module has the advantages of Tri Band operation and high throughput class 10 GPRS capabilities, also 2 serial interfaces.

The TC45 module is Dual Band and has the capability to store and process bespoke Java software with either one serial interface and 9 GPIO pins or 2 serial interfaces.

We trust you will find this terminal suits your application and we would be pleased to hear of the many different applications where the product is used. In our constant drive to provide the very best in customer satisfaction, we would also appreciate feedback on how we could improve the product or enhance the product for particular applications.

TTS can also provide bespoke software services to empower custom applications.

2. EXTERIOR VIEWS

Figure A - View of the 26 Way connector face of the terminal

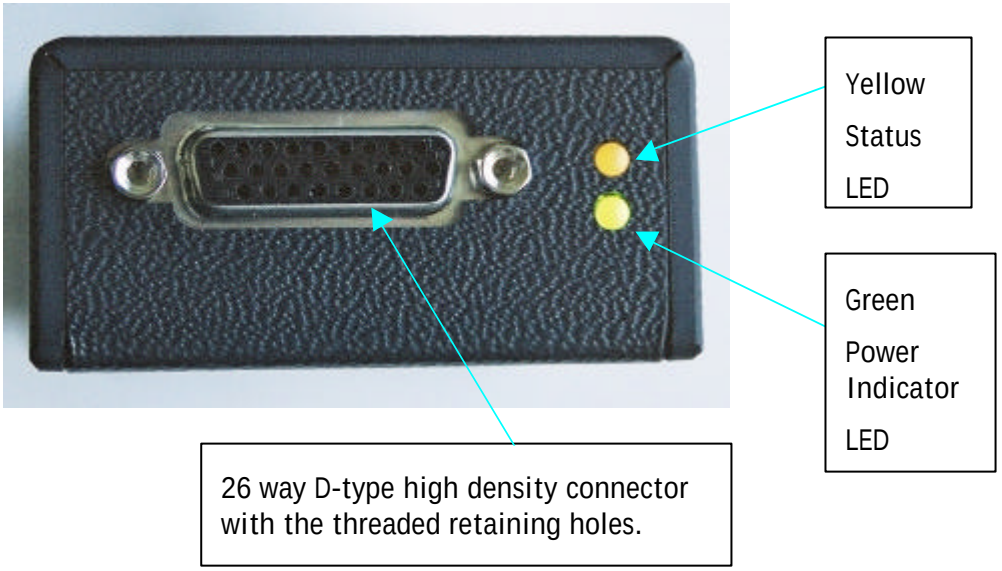
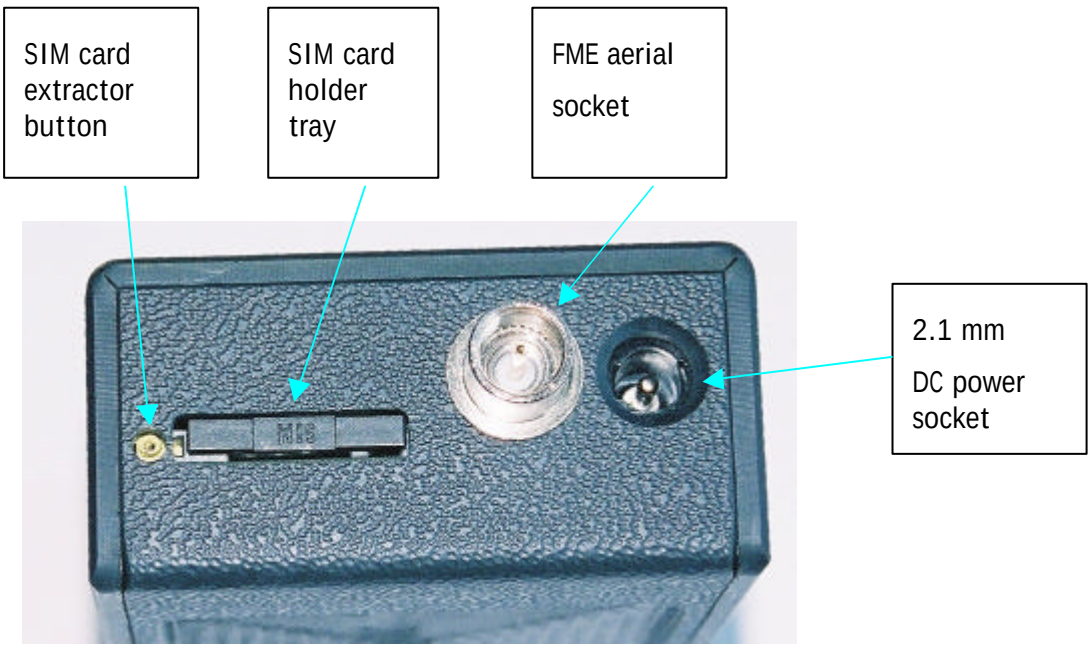


Figure B – View of the SIM card holder face of the terminal



3. CONNECTIONS

3.1 POWER

The power connector is a 2.1mm dc socket.

Centre pin positive.

DC operating range: minimum 8 Volts DC to maximum 30 Volts DC.

The power supply must be capable of a minimum 1 Amp at 12 Volts DC nominal operating voltage. We strongly recommend a CE approved, smoothed supply, fused at 2Amps or short circuit protected.

The power socket is capable of accepting coaxial plugs with 2 retaining ears.

The unit will automatically start the MC45 module approximately 1 second after connection of the DC power. This is to protect the MC45 module from power transients.

Please note the aerial screen and serial lead screen are electrically connected to the –ve ground.

When fixing the unit inside a vehicle with positive earth, we strongly recommend using the DIN rail mounting for added insulation, and care should be taken to make sure both power leads are fused and the aerial socket body is insulated from the vehicle earth. Also the aerial screen and serial cable screen must be isolated from the vehicle chassis if the vehicle has a positive earth.

When fixing the unit inside vehicles with negative earth systems, the positive (+12V) lead must be fused at 2A, again the DIN rail mount method is recommended.

3.1.1 POWER MODE A = AUTOMATIC RESTART ON APPLICATION OF POWER

Setting the internal DIL switch to position A will set the auto-start mode whereby application of power will restart the terminal. This is possible after the AT^SMSO command has been used to switch the terminal off. In this mode the DTR line signal transitions will not reset the terminal.

For most applications this mode would be the most appropriate normal operating mode.

3.1.2 POWER MODE 1 = DTR CONTROLLED RESET OF TERMINAL

Setting the DIL switch to position 1 will set the terminal to DTR controlled reset where lowering and raising the DTR line on the main serial interface will power on and reset the terminal. This is possible after the AT^SMSO command has been used

to switch the terminal off. In this mode if the power is disconnected and reconnected the DTR line will need to be toggled before the terminal will restart.

This mode must be selected for firmware updating via the serial interface.

3.2 AERIAL SOCKET

The FME aerial socket is mounted on the case shell. Ensure the terminal is never powered without an appropriate aerial connected, to avoid damage to the MC45 module. Also when attaching an aerial ensure that excessive torque is not applied to the aerial socket, it is sufficient to lightly hand tighten the FME aerial plug.

3.3 26 WAY COMPACT D-TYPE CONNECTION

TTS supply a range of accessory cables for connection to the terminal.

We strongly recommend the use of TTS supplied cables since these have been tested as part of the approvals process and some cables contain active components.

Pin	Application
1	Reset
2	Microphone positive 1
3	Microphone negative 1
4	A Ground
5	+5V limited to 50mA max*
6	RS232-0 CTS
7	RS232-0 RTS
8	RS232-0 DCD
9	RS232-0 TXD
10	RSFDAI GPIO–7 GRP-1
11	Earphone positive 1
12	Earphone negative 1
13	Microphone negative 2
14	Microphone positive 2
15	RS232-0 DTR
16	RS232-0 RI
17	RS232-0 DSR
18	RS232-0 RXD
19	TXD (DAI) GPIO 4 GRP 1
20	SCLK (DAI) GPIO 6 GRP 1
21	TFS (DAI) GPIO 8 GRP 1
22	RXD (DAI) GPIO 5 GRP 1
23	UART 1 RXD GPIO 0 GRP 0

24	UART 1 TXD GPIO 1 GRP 0
25	UART 1 CTS GPIO 2 GRP 0
26	UART 1 RTS GPIO 3 GRP 0
shell	ground

*Devices drawing current on the +5V pin 5 may damage or affect performance of the terminal and it is recommended that this pin is only used for TTS approved cables or interfaces.

We have limited the range of signals on the serial cables to no more than a total of 6m from the terminal.

If non-TTS supplied cables are used, careful attention should be paid to the Siemens MC45 or TC45 hardware descriptions for interface requirements and level adjusting requirements.

3.4 D-TYPE DATA CONNECTIONS ON TTS CABLE TYPES 1 AND 2

D type 9 pin female socket DCE configuration on the end of each TTS provided cable. Cables with 2 RS232 interfaces have similar pin configurations. Plugs will be labelled main (2m) and secondary port (0.5m), and will be easily identified by the length from the terminal socket.

Pin	Application	Pins available on Second RS232 port
1	DCD data carrier detect	**
2	RX receive data	Yes
3	TX transmit data	Yes
4	DTR data terminal ready	**
5	Ground	Yes
6	DSR data set ready	**
7	RTS request to send	Yes
8	CTS clear to send	Yes
9	Ring Indicator	**

The 2 RS232 port cable includes active components, the pins marked ** are not available on the secondary RS232 port.

4. PRECAUTIONS

4.1 ANTI-STATIC

Under normal circumstances it will not be necessary to touch the PCB even when mounting the terminal using the internal lid "push-out" holes.

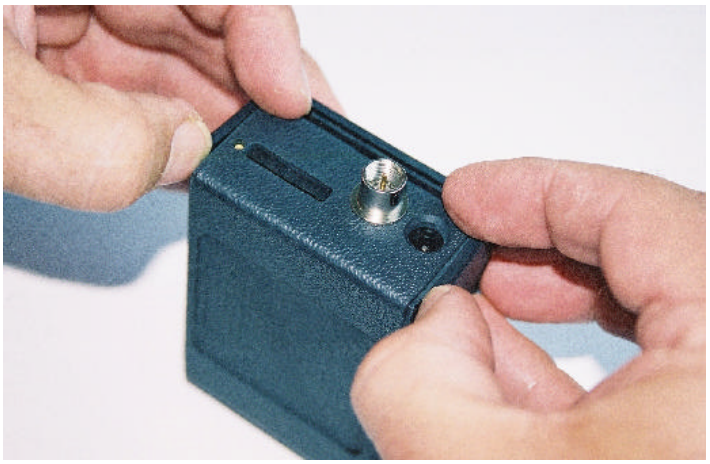
If it is necessary to handle the PCB use antistatic precautions, for example to insert or remove an MC45 or TC45 module. This should only be performed by TTS trained and authorised agents or distributors.

4.2 SAFE MOUNTING

Tactus recommend plastic mounts of UL-94 V0 material are used with mounting to an external clamp device.

The terminal lid has 4 "push out" holes, which may be pushed through to allow the unit to be screw mounted to a suitable surface or to the Bopla DIN rail mount part number TSH35.

To access the 4 "push-out" mounting holes it is necessary to carefully remove the terminal case lid (the part without a label). This is achieved by gently inserting 2 thumb nails and prising the edges of the lid open by no more than 3 mm, then carefully sliding out the base which holds the PCB firmly, being careful not to touch the PCB. DO NOT ATTEMPT TO REMOVE THE PCB FROM THE UNIT BASE.



When mounting, ensure the surface is flat, so this does not cause the unit lid shape to distort. Also the screw head used must not protrude inside the case by more than 3mm, therefore we strongly recommend a 2mm diameter self tapping low profile truss head or washer head fixing of appropriate length.

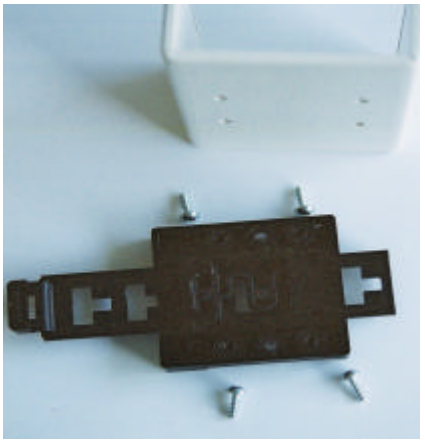
When fixing inside vehicles, the unit should be securely mounted to lining or other internal surfaces where the unit will not suffer from external damage or excess heat and be located in dry conditions. The unit must not be mounted

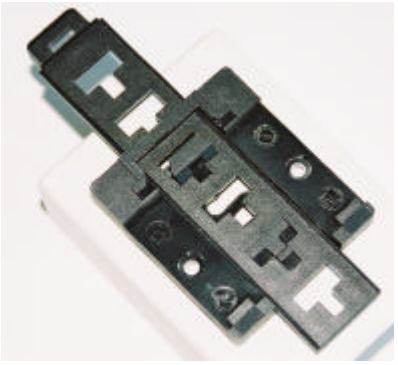
adjacent to the vehicle engine, and care should be taken during installation to avoid damage to any existing mechanical parts, pipes, wires or tanks.

In some situations, due to the low mass of the unit, it may be practical to use strong double sided adhesive mounts with a foam barrier. This depends largely on the material to which the unit will be fixed and the mechanical movements anticipated at the installation site.

Cables should be installed with strain relief fixings to avoid excess strain being applied to the terminal connectors.

A recommended DIN rail mount is shown.





4.3 VENTILATION

The unit should be mounted where the 12W power consumption can be safely dissipated.

4.4 REMOVAL OF MC45 OR TC45 MODULES

We recommend the MC45 or TC45 module is only inserted or removed from the PCB by trained and authorised agents or distributors of TTS terminals.

However if this does become necessary, please ensure that when the module is lifted, equal force is applied on both sides of connector CN1, without twisting the connector. The aerial lead should only be removed using the HiRose extraction tool Ref E.FL.LP-H.

The PCB cannot be physically removed from the base without first extracting the FME aerial connector from the case assembly. Care should be taken not to rotate the body of the FME socket, which has an aligning flat on the base of the threaded body of the socket, which passes through the case.

5. SIM CARD

5.1 1900, 1800 OR 900 MHZ PCS, DCS, GSM OPERATION

The SIM card should allow service on the appropriate network.

5.2 GPRS ENABLED

A SIM card with GPRS enabled is necessary for using the GPRS capabilities of the MTC45 terminal.

5.3 SIM CARD INSERTION

Insert the SIM card with the Power disconnected from the terminal.

To remove the SIM card holder, gently push the yellow recessed button adjacent to the SIM card slot, using a suitable tool with a diameter of less than 2mm and length of at least 5mm to enable the SIM card holder to be ejected sufficiently far to grasp the tray to remove the SIM card holder from the drawer slot.

Place the small SIM card on the SIM card holder and insert the holder with the contacts facing downwards when looking at the SIM card holder, with the aerial and power sockets on the right hand side - see below.

Ensure the SIM is inserted in the tray in the correct orientation.

Never remove the SIM with the power connected as damage to the MC45 module or the SIM card may result.

6. INDICATORS

6.1 POWER INDICATOR

The Green LED power indicator shows that power is connected to the terminal.

6.2 STATUS INDICATOR

The Yellow LED status indicator is enabled by sending the command AT^SSYNC=1 and follows the indications given in the Table below.

LED Mode	Operating Status
Off	MC45 is off or run in SLEEP, Alarm or Charge only mode
600 ms On / 600 ms Off	No SIM card inserted or PIN entered or network search in progress or ongoing user authentication or network login in progress.
75 ms On / 3 sec Off	Logged on to network (monitoring control channels and user interactions). No call in progress.
75 ms On / 75ms Off /75 ms On / 3s Off	One or more GPRS contexts activated.
Flashing	Indicates GPRS data transfer: When a GPRS transfer is in progress, the LED goes on within 1 second after data packets were exchanged. Flash duration is approximately 0.5 seconds.
On	Depending on type of call: Voice call: Connected to remote party Data call: Connected to remote party or exchange of parameters while setting up or disconnecting a call.

7. COMMUNICATION WITH THE TERMINAL

7.1 VIA AT COMMANDS

The Siemens manual (Reference MC45_ATC_01_V00.02 2 July 2002) details the full AT command set for controlling the MC45 module.

The Siemens manual (Reference TC45_ATC_V00.02 23 April 2003) details the full AT command set for controlling the TC45 module.

7.2 VIA ANALOGUE AND DIGITAL AUDIO INTERFACES

The Siemens MC45Hardware Interface Description manual (Reference MC45_HD_01_V00.02 26 June 2002) for details the physical interfaces.

The Siemens TC45Hardware Interface Description manual (Reference TC45_HD_V00.02 24 April 2003) for details the physical interfaces.

Note: access to these interfaces and GPIO pins require TTS interface cables types 3 & 4 which will be available shortly. It is not possible to use the group 0 GPIO pins using the cable type 2 due to the active components in this cable.

8. PHYSICAL CHARACTERISTICS

8.1 CASE

The case is Black ABS plastic to UL specification UL-94_V0 fire resistant material.

8.2 OPERATING TEMPERATURE RANGE

The operating temperature range of the terminal is from –15 degrees C to +50 degrees C.

The RF module will automatically shut down in over temperature situations.

8.3 CERTIFICATION

The terminal is tested and approved to the R&TTE directive, and carries the CE mark.

Additionally, the unit has been tested by the VCA and approved for vehicle installation and carries the e11 mark, reference 022143.

The Siemens modules used in the terminal are compliant with the following directives:

99/05/EC- R&TTE, 89/336/EC-EMC, 73/23/EC-Low Voltage Equipment, FCC-US equipment, UL-US Safety, ETS 300 607-1 Digital Cellular Telecommunications (Phase 2), ETSI EN 301 511 GSM, ETSI EN 301 489-7 ERM & EMC, EN 60 950 Safety of IT Equipment, UL 60 950 Safety, CFR Title 47 PCS, IEC60068 Environmental, DIN EN 60529 IP codes, EN50360 EU SAR, ES 59005/ANS US SAR.

8.4 WEIGHT

The unit weighs 132 grams including the RF module.

8.5 EXTERNAL DIMENSIONS

30mm high x 61mm wide x 84mm long

9. ACCESSORIES

9.1 CABLE 1 – 26WAY TERMINAL SOCKET TO A SINGLE 9 WAY D TYPE FEMALE DCE CONNECTOR.

Length 2.0m colour black with integral RF suppression.

9.2 CABLE 2 – 26WAY TERMINAL SOCKET TO DUAL 9 WAY D TYPE FEMALE DCE CONNECTORS.

Length 2m to main serial port (black) and 1m to the secondary serial port (red)*. With integral RF suppression and signal conversion.

*To enable the secondary port on the TC45 use the command AT^SFIM=1,1 since the default is that this port is disabled. Whereas the MC45 has the second serial port enabled by default.

When using this dual port cable, the secondary port cannot be used for the GPIO available on the TC45 module.

10. SAFETY PRECAUTIONS

Refer to Siemens documentation listed in section 7.2 for full safety precautions. Be aware that you must follow this advice as with all GSM based radio equipment;

- DO NOT USE IN HOSPITALS OR OTHER RESTRICTED LOCATIONS
- DO NOT USE IN AIRCRAFT
- DO NOT USE NEAR FLAMMABLE GASES OR EXPLOSIVES
- AVOID USE WHERE IT WILL INTERFERE WITH RADIO, TV OR COMPUTER EQUIPMENT
- DO NOT MANUALLY OPERATE CELLULAR EQUIPMENT WHILST DRIVING A VEHICLE, USE OF HANDSFREE INTERFACES MAY BE PERMITTED.
- SOS CALLS MAY REQUIRE VALID SIM CARDS AND MAY NOT BE POSSIBLE IN ALL LOCATIONS DUE TO THE RESTRICTIONS OF WIRELESS RADIO FREQUENCY COVERAGE.

11. WARRANTY

The unit is covered by 12 months parts and labour, return to manufacturer warranty.

Refer to the TTS terms and conditions of sale for the full warranty conditions.

11.1 PHONE

Contact Tactus Telemetry Solutions in the UK on +44 (0)1454 878795.

11.2 WWW

Web pages at www.tactustelemetry.com

11.3 EMAIL

SUPPORT@Tactustelemetry.com state where and when you purchased the unit and whether you are using it with an MC or TC45 module, unit serial number, together with the nature of the problem.

12. GLOSSARY OF TERMS & ABBREVIATIONS

Term	Meaning
TTS	Tactus Telemetry Solutions Ltd
GSM	Originally Groupe Spéciale Mobile now Global System for Mobiles.
GPRS	General Packet Radio System
MC45 & TC45	Siemens ag rf modules
LED	Light emitting diode
DC	Direct Current
DCE	Data Communication Equipment
CE	Conformité Europeanne
FME	Type of aerial plug and socket.
PCB	Printed Circuit Board
UL-94 V0	Underwriters Laboratories –standards organisation.
DIN	Deutsches Institut fur Normung e.v.
SIM	Subscriber Identity Module
ABS	Acrylonitrile-Butadiene-Styrene
R&TTE	Radio and Telecommunications Terminal Equipment – European Directive
VCA	Vehicle Certification Authority- UK government organisation.
RF	Radio Frequency
DAI	Digital Audio Interface